



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

09/743,430

01/08/2001

Wendelin Feiten

P00,1928

1030

7590

05/26/2004

Schiff Hardin & Waite
6600 Sears Tower
233 South Wacker Drive
Chicago, IL 60606-6473

EXAMINER

STREGE, JOHN B

ART UNIT

PAPER NUMBER

2625

DATE MAILED: 05/26/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/743,430

Applicant(s)

FEITEN ET AL.

Examiner

John B Strege

Art Unit

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16-18, 21-40, 42-44, 47-55 and 58 is/are rejected.
- 7) ☒ Claim(s) 15, 19, 20, 41, 45, 46, 56 and 57 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. This action is in response to the amendments/arguments filed 4/6/04.
2. The objections to claims 4, and 7 are hereby withdrawn as a result of the amended claims. The objection to the declaration is also withdrawn as a result of the attached Appendix. Furthermore, based on the Applicants' persuasive arguments the 35 USC 112 rejections of claims 13 and 39 are hereby withdrawn.
3. The Applicants' arguments regarding the 35 USC 102, and 35 USC 103 claims have been fully considered but they are not persuasive.

The Applicants' argue that Alves fails to teach all of the elements of independent claims 1 and 27. Specifically the Applicants' state that Alves provides no suggestion for an association of environmental information with basis elements. However, the claim language does not clearly define the environmental information. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore, Alves specifically discloses that the relationship between every ribbon pair is computed and that the relationships are of type spatial (proximity to one another) or comparative (attribute comparisons) (col. 6 lines 38-42). This can be read as an association of environmental information with basis elements. The other arguments given by the Applicants' reflect differences in the

Art Unit: 2625

Applicants' invention and Alves, however do not reflect differences between Alves and the claimed invention.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this

Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-12, 14, 17-18, 21-23, 27-38, 40, 43-44, 47-49, and 54 are rejected under 35 U.S.C. 102(b) as being anticipated by Alves et al. USPN 5,093,869 (hereinafter "Alves").

Claim 1 discloses, "a method for the computer-aided determination of a measure of similarity between a first structure and at least one predetermined second structure." Fig 1 displays a graph matcher (12, and 14) that determines the similarity between two scenes or images (col. 3 lines 21-27). Either the images themselves or the objects contained within the images such as vehicles, buildings, landmarks, etc. can be interpreted to be structures. For this argument we will consider the objects contained in the images to be the structures.

Claim 1 further states that the method is comprised of the steps of "defining at least one base element for said first structure and said second structure." Alves discloses ribbons, which are long and narrow regions of nearly uniform intensity that identify linear boundaries of objects within the image (col. 3

Art Unit: 2625

lines 11-16). These ribbons are found for the sensed image as well as for the reference image (col. 7 lines 9-13).

The method of claim 1 is further composed of "assigning surroundings-related information to each of said at least one base elements, said surroundings-related information characterizing a corresponding said base element." Alves discloses giving attributes to the ribbons objects which include; intensity, polarity, width, and orientation (col. 6 lines 20-32). The relationship between these ribbons and other ribbons as well as other regions of the image are computed based on proximity to one another (col. 6 lines 38-42). From this information and attributes a graph is formulated which symbolically represents the original imaged scene (col. 6 lines 54-56), and this is done also for the reference scene (col. 7 lines 9-16).

Finally the method of claim 1 concludes, "determining a measure of similarity, which describes a similarity between said first structure and said second structure, for said first structure and said second structure, said measure of similarity being determined in a manner dependent on said base elements and on said surroundings-related information assigned to said base elements." Alves discloses a graph matching process (Fig. 2 37) that compares the reference and sensed graph and generates a best common sub graph between the two based on the degree of similarity. As discussed above the reference and sensed graphs are derived from base elements and the surrounding related information of them.

Art Unit: 2625

Claim 2 discloses, "the method as claimed in claim 1, further comprising the step of including a plurality of base elements within said first structure or said second structure." Alves discloses plural ribbons (col. 5 line 65).

Claim 3 recites, "the method as claimed in claim 1, further comprising the step of including said first structure and said second structure in at least one map." Alves discloses a graph that symbolically represents the objects within a scene (col. 6 last paragraph). Since the landmark is present in the sensed image as well as the reference image they are both included in the map.

Claim 4 discloses recording a map with a recorder. Claims 5 discloses using a scanner and claim 6 a camera as the recording device. Alves discloses that the reference graphs are prepared from video data which provide mission planning information (col.3 lines 52-53). A video camera can be considered to be a type of scanner so this covers claims 5 and 6.

Claim 7 discloses, "the method as claimed in claim 1, wherein said step of determining a measure of similarity encompasses a plurality of base elements and their respectively assigned surroundings-related information." As stated above the graph matching process compares the reference and sensed graphs which are derived from multiple ribbons and their respective surroundings-related information.

Claim 8 discloses, "The method as claimed in claim 1, wherein at least a portion of said at least one base element is a line of predeterminable form." A ribbon identifies linear boundaries between regions (col. 3 lines 11-14). During

Art Unit: 2625

the object formation process, lines within the ribbon are found with different constraints (col. 6 lines 20-32).

Claim 9 discloses, "The method as claimed in claim 8, wherein at least a portion of said at least one base element is a section." A line is a section, therefore the same argument used for claim 8 applies equally to claim nine.

Claim 10 discloses, "The method as claimed in claim 1, wherein at least a portion of said at least one base element is a point." A line is a locus of points therefore the same argument used for claim 8 applies equally to claim 10.

Claim 11 discloses, "The method as claimed in claim 1, further comprising the step of forming said surroundings-related information by further base elements and their geometrical arrangement relative to said at least one base element." Alves explicitly states that the relationships between the ribbons are computed (col. 6 lines 38-40) and this is done with the attributes of the ribbons, which includes orientation (col. 6 line 32).

Claim 12 discloses, "The method as claimed in claim 1, wherein base elements have different forms." The ribbons have different attributes depending on the objects they represent therefore it is inherent that they have different forms.

Claim 14 discloses, "The method as claimed in claim 11, further comprising the step of grouping further base elements into a plurality of surroundings-related information types containing surroundings-related information features which are each assigned to a surroundings-related information type." In Alves' disclosure the surrounding elements are used in order

Art Unit: 2625

to give attributes to the ribbon objects, which include the intensity, polarity, width, and orientation of the ribbon (col. 6 lines 28-32). Furthermore, Alves discloses that the relationship between every ribbon pair is computed (col. 6 lines 38-40).

Claim 17 recites, "the method as claimed claim 1, further comprising the step of operating on a plurality of further structures, a measure of similarity between said first structure and a respective further structure being determined in each case." Alves discloses reference graphs that represent objects that are compared to image data for multiple objects in order to find target objects (col. 3 lines 49-59). Therefore similarity is found between a plurality of structures.

Claim 18 discloses, "the method as claimed in claim 17, further comprising the step of implementing said method repeatedly for different base elements, thus forming a plurality of measures of similarity." Alves discloses using different base elements and finding the comparative relationship between them, such as the relationship between ribbons and regions (col. 6 lines 38-42).

Claim 21 discloses, "The method as claimed in claim 1, wherein said first structure or said second structure describes data structures in a database." Alves discloses a reference graph storage memory 16 which represent physical objects (col. 2 lines 49-58).

Claim 22 discloses, "the method as claimed in claim 1, wherein said first structure or said second structure describes a physical object." Alves discloses target objects present in the video data used to create the image used by the process which contain physical objects such as vehicles, buildings, landmarks, etc.

Art Unit: 2625

Claim 23 discloses, "the method as claimed in claim 1, wherein said first structure describes a physical object and said second structure describes a model of a physical object." As stated above either the images themselves or the objects contained in the images can be interpreted to be the structures. Therefore the first structure can be perceived to be the sensed object, and the second structure can be perceived to be the reference graph which describes a model of a physical object.

Claims 27-38, 40, 43-44, and 47-49 are identical to claims 1-12, 14, 17-18, and 21-23 except claims 27-38, 40, 43-44, and 47-49 are apparatus claims. Thus, arguments similar to that presented above for claims 1-12, 14, 17-18, and 21-23 are equally applicable to claims 27-38, 40, 43-44, and 47-49.

Claim 54 recites, "the arrangement as claimed in claim 38, wherein said processor is to configured to operate on said further base elements that are grouped into a plurality of surroundings-related information types containing surroundings-related information features which are each assigned to a surroundings-related information type." As discussed above, Alves discloses all of the limitations of claim 38. Alves discloses a plurality of surroundings-related information features that are each assigned certain attributes that are obtained from other base elements (col. 6 lines 20-32).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 16 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alves et al USPN 5,093,869 (hereinafter "Alves") in view of Nasar et al. USPN 5,144,685 (hereinafter "Nasar").

Claim 16 discloses, "The method as claimed in claim 1, wherein said measure of similarity is determined with dynamic programming."

Alves recites all of the limitations of Claim 1. Alves does not explicitly recite that the measure of similarity is determined with dynamic programming.

Nasar discloses measuring the similarity of two landmark descriptions using dynamic model matching (col. 3 lines 55-60). Nasar further discloses that using his invention with the dynamic model matching can reduce the computational complexity of the problem (col. 1 lines 34-41).

Alves and Nasar are analogous art because they are from the same field of endeavor of navigation systems.

At the time of the invention it would have been obvious to one skilled in the art to combine Alves with Nasar in order to use dynamic programming to

Art Unit: 2625

determine the similarity between landmarks. The motivation for doing so would be to speed up the computational time involved in the processing.

Therefore it would have been obvious to one skilled in the art to combine Alves with Nasar to obtain the invention as specified in claim 16.

Claim 42 is identical to claim 16 except claim 42 is an apparatus claim. Thus, the argument used for claim 16 is equally applicable to claim 42.

8. Claim 13, 39, and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alves et al USPN 5,093,869 (hereinafter "Alves") in view of Itoh et al. USPN 5,386,378 (hereinafter "Itoh").

Claim 13 recites, "the method as claimed in claim 3, further comprising the step of forming at least a portion of said surroundings-related information in such a way that it is invariant with respect to errors which occur when constructing said at least one map." As discussed above Alves meets the limitations of claim 3. Alves does not disclose forming surroundings-related information in such a way that it is invariant with respect to errors.

Itoh teaches that shift invariance is maintained in pattern matching with the use of a Fourier transforming system (col. 2 lines 32-35).

Alves and Itoh are analogous art because they are from the same field of endeavor of pattern recognition.

At the time of the invention it would have been obvious to one skilled in the art to combine Alves and Itoh. The motivation for doing so would be so that errors that do not affect the outcome of a calculation are not taken into effect in

Art Unit: 2625

making the calculation. Therefore it would be obvious to one skilled in the art to combine Alves and Itoh in order to obtain the invention specified in claim 13.

Claim 39 is identical to claim 13 except claim 39 is an apparatus claim. Thus, the argument used for claim 13 is equally applicable to claim 39.

Claim 55 recites, "the arrangement as claimed in claim 39, wherein said processor is configured to operate on said further base elements that are grouped into a plurality of surroundings-related information types containing surroundings-related information features which are each assigned to a surroundings-related information type." Alves discloses a plurality of surroundings-related information features that are each assigned certain attributes that are obtained from other base elements (col. 6 lines 20-32). Therefore as stated above it would be obvious to one skilled in the art to combine Alves with Itoh in order to obtain the invention as specified in claim 55.

9. Claims 24, 25, 26, 50-52, 53, and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alves et al USPN 5,093,869 (hereinafter "Alves") in view of Bauer USPN 5,684,695.

Claim 24 recites, "The method as claimed in claim 1, further comprising the step of determining a map for a mobile autonomous apparatus." Alves discloses all of the limitations of claim 1, however does not explicitly disclose the limitations set forth by claim 24.

Claim 25 recites, "the method as claimed in claim 1, further comprising the step of orientating a mobile autonomous apparatus." Alves discloses all of the

Art Unit: 2625

limitations of claim 1, however does not explicitly disclose the limitations set forth by claims 25.

Bauer discloses a method for constructing an environment map of a self-propelled mobile unit. Bauer states that, "an autonomous, mobile robot must both construct a reliable map of its work environment in a step-by-step manner; as well as be able to localize itself utilizing this map at any given point in time" (col. 1 lines 20-23). This shows the step of determining a map for a mobile autonomous apparatus. The process of localization of the robot can be understood to be orientating itself.

Alves and Bauer are analogous art because they are from the same field of endeavor of navigation systems.

At the time of the invention it would have been obvious to one skilled in the art to combine Bauer and Alves. Bauer states that a mobile robot must be able to construct a reliable map of its work environment, and Alves discloses a manner of doing so. The motivation for combining Bauer and Alves would be to create a robot that utilizes the precision of a scene recognition system. Therefore it would have been obvious to one skilled in the art to combine Alves and Bauer in order to obtain the invention specified in claims 24 and 25.

Claim 26 recites, "the method as claimed in claim 24, wherein said mobile autonomous apparatus is a robot." Alves does not explicitly disclose the limitations set forth by claim 26 but as stated above Bauer does. Therefore the two references can be combined with the same motivation as stated above in order to obtain the invention as disclosed in claim 26.

Art Unit: 2625

Claim 53 recites, "the method as claimed in claim 25, wherein said mobile autonomous apparatus is a robot." Alves does not explicitly disclose the limitations set forth by claim 53 but as stated above Bauer does. Therefore the two references can be combined with the same motivation as stated above in order to obtain the invention as disclosed in claim 53.

Claims 50-52 are identical to claims 24-26 except claims 50-52 are apparatus claims. Thus, the argument used for claims 24-26 are equally applicable to claims 50-52.

Claim 58 discloses, "the arrangement as claimed in claim 51, wherein said mobile autonomous apparatus is a robot." This claim is similar to the other claims discussed above and the same argument applies in its rejection.

Claim Objections

10. Claims 15, 19-20, 41, 45-46, and 56-57 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is

Art Unit: 2625

filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B Strege whose telephone number is (703) 305-8679. The examiner can normally be reached on Monday-Friday between the hours of 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (703) 308-5246. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 2625

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JS



BHAVESH M. MEHTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600